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(54) Automatic sheet feeding device.

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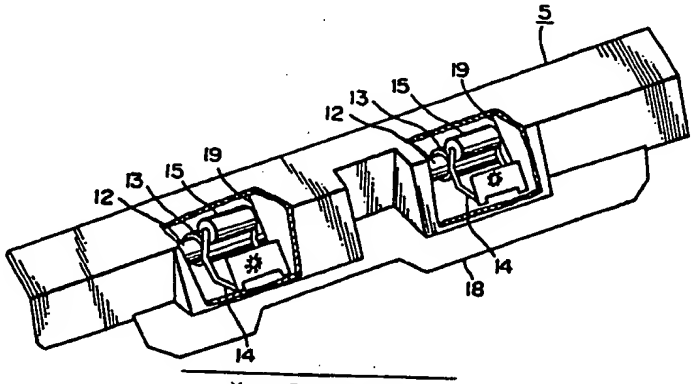
Fig.3



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AUTOMATIC SHEET FEEDING DEVICE

The present invention relates to an automatic sheet feeding device capable of feeding a printing sheet to a printer and collecting and stacking the sheet printed by the printer.

The automatic sheet feeding device has conventionally been employed to continuously feed a plurality of cut printing sheet to the printer. Such prior art automatic sheet feeding device is generally composed of four elements, namely, a hopper portion for storing the printing paper, a sheet feeding portion for feeding the printing sheet one by one to the printer, a sheet collecting portion for collecting the sheet printed and discharged by the printer and a stacking portion for stacking the collected sheet. The sheet collecting portion is composed of a driving roller for rotating synchronously with a sheet feed mechanism of the printer, a pressing roller for rotatably bringing into contact with the driving roller, and a sheet guide for guiding the printed sheet discharged from the printer between the driving roller and the pressing roller.

In the sheet collecting portion, the pressing roller is pressed against the driving roller by a pressing means having resilience such as a leaf spring. Hence, even if a fixing position or an outer diameter of the driving roller is inappropriate or varied, the pressing roller is always kept in pressing against the driving roller. It is the same when the driving roller is abraded or worn.

Although the pressing roller moves accompanied by the movement of the driving roller, the guide for guiding the sheet between the driving roller and the pressing roller does not move. Hence, the sheet guide can not function properly. As a result, the sheet is not entered into and guided by the driving roller and the pressing roller but liable to be bent just before entering between the driving roller and the pressing roller.

The present invention has been made in view of the drawbacks of the prior art automatic sheet feeding device set forth above.

Accordingly, it is an object of the present invention to provide an automatic sheet feeding device capable of guiding the printed sheet between the driving roller and the pressing roller without bending the printed sheet even if the fixing position or the diameter of the driving roller is different from the designed value thereof or varied.

To achieve the above object, the automatic sheet feeding device according to the present invention includes a leaf spring as well as a sheet guide wherein the printed sheet is guided between the driving roller and the pressing roller by the leaf spring or the sheet guide.

The above and other objects, features and advantages of the present invention will become more apparent from the following description taken in conjunction with the accompanying drawings.

Fig. 1 is a perspective view showing an automatic sheet feeding device;

Fig. 2 is a perspective view of assistance in explaining a state where the automatic sheet feeding device of Fig. 1 is mounted on a printer;

Fig. 3 is a schematic perspective view of assistance in explaining a sheet collecting portion of the automatic sheet feeding device of Fig. 1;

Fig. 4 is a schematic perspective view of assistance in explaining a portion adjacent to a driving roller of the sheet collecting portion of Fig. 3;

Fig. 5 is a side sectional view of assistance in explaining the sheet collecting portion of Fig. 3 wherein a sheet is guided by a guide rib; and

Fig. 6 is a side sectional view of assistance in explaining the sheet collecting portion of Fig. 3 wherein a sheet is guided by a leaf spring.

An automatic sheet feeding device according to a preferred embodiment of the present invention will be described with reference to Figs. 1 through 6.

In Figs. 1 and 2, the automatic sheet feeding device to be mounted on a printer 9 comprises a hopper 1 for storing a cut printing sheet, a hopping roller positioned in front of the hopper 1 for feeding the printing sheet stored in the hopper 1 to the printer 9, a motor 3 positioned at the side of a frame of the automatic sheet feeding device for driving the hopping roller 2, a stacker 4 positioned in front of the hopping roller 2 for stacking the sheet printed by the printer 9, a sheet collector 5 positioned in front of the stacker 4 for feeding the sheet printed by the printer 9 to the stacker 4, a driven gear 6 for transmitting the driving force to the sheet collector 5, an idle gear 7 meshing the driven gear 6, and a plate 8 engaged with the printer 9, a driving gear 11 rotatable integrally with a platen 10 of the printer 9 and meshing with the idle gear 7, a shaft 12 rotatable integrally with the driven gear 6, a driving roller 13 rotatable integrally with the shaft 12, a leaf spring 14, a pressing roller 15 rotatably supported by the leaf spring 14, a motor 16 for rotating the platen 10, and a bail roller 17 for pressing against and contacting the platen 10.

A printed sheet is discharged from the printer 9 and passed the sheet collector 5 and fed to the stacker 4 where the printed sheet is stacked.

With the arrangement of the automatic sheet feeding device, when the hopping roller 2 is rotated by the motor 3 the printing sheet is fed from the

hopper 1 toward the platen 10. When the platen 10 is rotated by the motor 16 the printing sheet moves along the platen 10 while the printing sheet is printed. The printed sheet is pressed by the bail roller 17 against the platen 10 and enters into the sheet collector 5 and thereafter clamped by the driving roller 13 and the pressing roller 15. The driving roller 13 engages with the platen 10 via the shaft 12, the driven gear 6, the idle gear 7 and the driving gear 11. The driving roller 13 is rotated in synchronism with the platen 10 at substantially the same peripheral speed as that of the platen 10. The printed sheet is fed to the stacker 4 by the driving roller 13 and stacked therein.

The sheet collector 5 is schematically illustrated in Fig. 3. In the same figure, the sheet collector 5 comprises the sheet guide 18 integrally formed with the sheet collector 5 and a guide rib 19 integrally formed with the sheet guide 18. The sheet guide 18 and the guide rib 19 respectively guide the sheet between the driving roller 13 and the pressing roller 15.

The portion adjacent to the driving roller 13 is schematically illustrated in Fig. 4. The sheet guide 18 is integrated with a cylindrical projection 20 and the leaf spring 14 is integrated with teeth 21. The teeth 21 are arranged annularly and define a circular hole at the central portion thereof. The circular hole has a diameter less than that of the cylindrical projection 20. Hence, the teeth 21 engage with the projection 20 for keeping the engagement between the leaf spring 14 and the sheet guide 18. The leaf spring 14 has a sheet guide portion 14a and a folded portion 14b having an acute angle relative to an end thereof fixed to the sheet guide 18. The leaf spring 14 is bent between the folded portion 14b and the free end thereof in the direction toward the driving roller 13. The sheet guide portion 14a is formed on the folded portion and capable of guiding the sheet between the driving roller 13 and the pressing roller 15 accompanied by the variation of the fixing position of the pressing roller and the diameter of the pressing roller 15.

A printed sheet 22 is guided by the guide rib 19 as illustrated in Fig. 5. In the same figure, when a tip end 22a of the printed sheet 22 reaches the pressing roller 15 an incident angle of θ_1 is generated between the tip end 22a and the surface of the pressing roller 15. The incident angle of θ_1 is equal to an angle between a lower surface 19a of the guide rib 19 and the surface of the pressing roller 15. The incident angle θ_1 is set to be such a small value that the printed sheet is not prevented from being smoothly guided between the driving roller 13 and the presing roller 15.

When the driving roller 13 is deviated to the direction of the arrow A in Fig. 6, the pressing roller 15 is moved toward the arrow B. At that time, the tip end 22a of the printed sheet 22 is guided by the sheet guide portion 14a between the driving roller 13 and the pressing roller 15. At this time, the incident angle becomes θ_2 which is substantially same as the incident angle of θ_1 in Fig. 5. Accordingly, the printed sheet 22 is smoothly guided between the driving roller 13 and the pressing roller 15 irrespective of an incident angle θ_3 etween the lower surface 19a of the guide rib 19 and the surface of the pressing roller 15 which is greater than the incident angle θ_1 in Fig. 5.

Although the invention has been described in its preferred form with a certain degree of particularity, it is to be understood that many variations and changes are possible in the invention without departing from the scope thereof.

Claims

1. An automatic sheet feeding device adapted to be mounted on a printer comprising:
a stacker (4) for stacking a sheet printed by the printer,
a driving roller (13) for feeding the printed sheet to the stacker (4);
a pressing roller (15) for pressing the printed sheet against the driving roller (13);
a sheet guide (18) fixed to the automatic sheet feeding device and positioned under the driving roller (13) for guiding the printed paper between the driving roller (13) and the pressing roller (15);
a leaf spring (14) having one end fixed to the sheet guide (18) and another end for rotatably supporting and urging the pressing roller (15), said leaf spring (14) having a folded portion (14b) which is folded in acute angle and a projection (20) in the direction to urge the pressing roller (15) between the folded portion (14b) and an end thereof for rotatably supporting the pressing roller (15);
characterized in that said leaf spring (14) or the sheet guide (18) guides the printed sheet between the driving roller (13) and the pressing roller (15).

2. An automatic sheet feeding device according to Claim 1, wherein the driving roller (13) is rotated in synchronism with the movement of the sheet feeding mechanism of the printer.

3. An automatic sheet feeding device according to Claim 2, wherein the sheet guide (18) is provided with a guide rib (19) for guiding the printed sheet between the driving roller (13) and the pressing roller.

4. An automatic sheet feeding device according to Claim 3, wherein the leaf spring (14) has two divided portions which support both ends of the pressing roller (15).

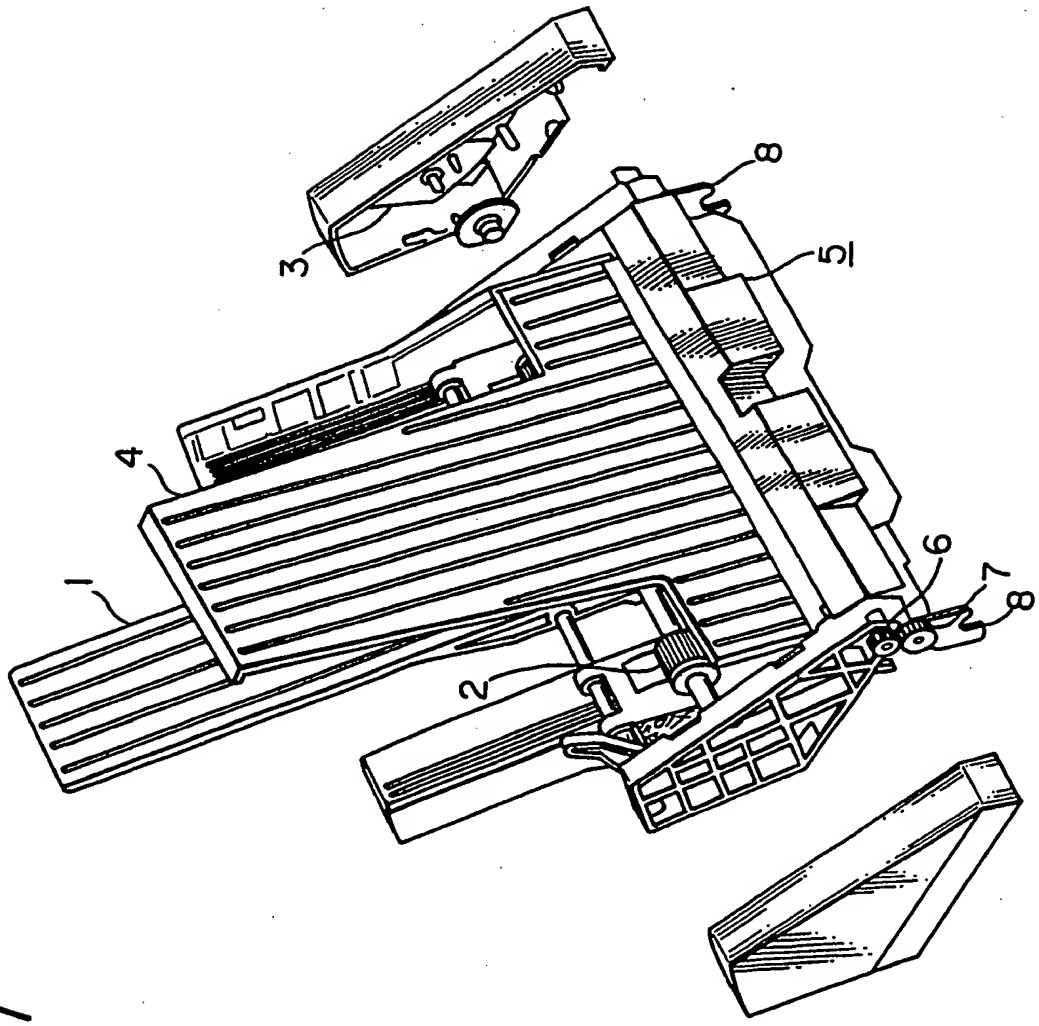
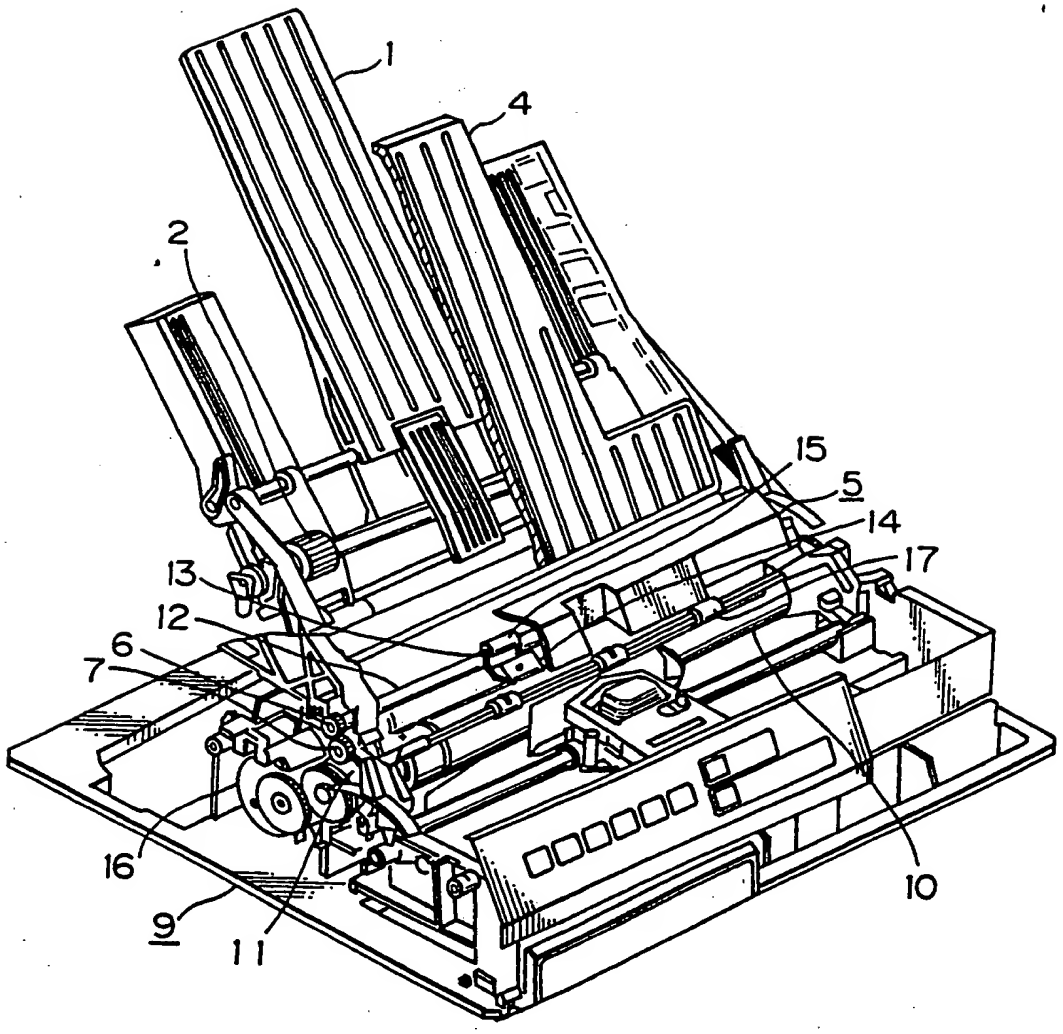


Fig.1

Fig. 2



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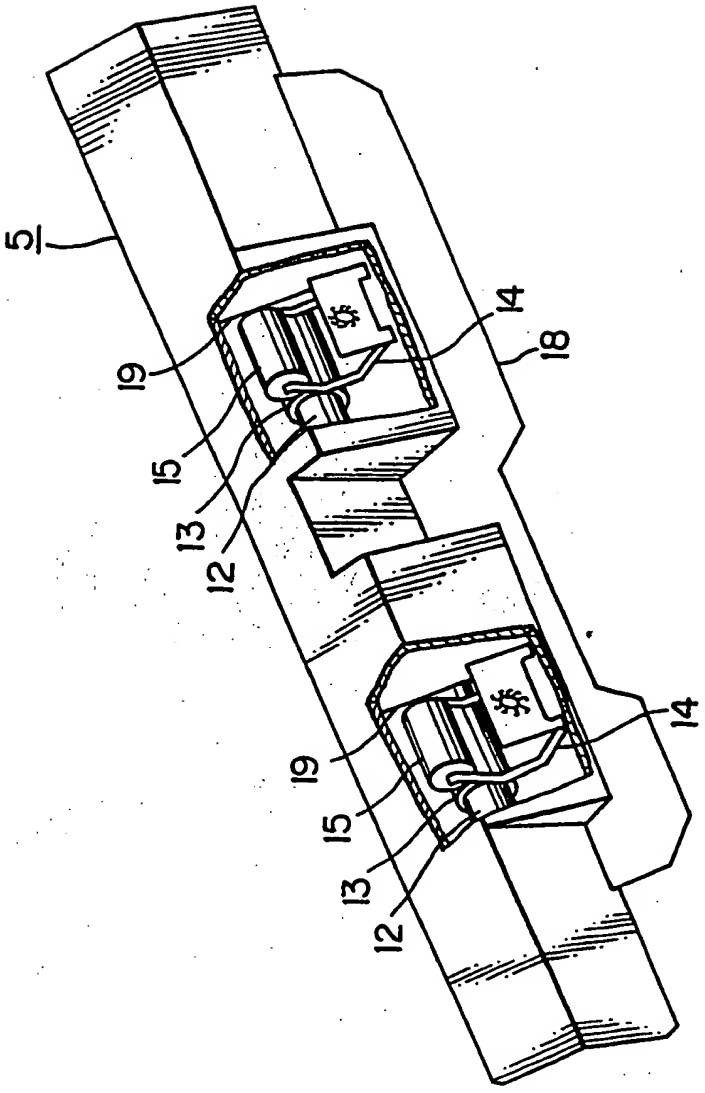


Fig. 4

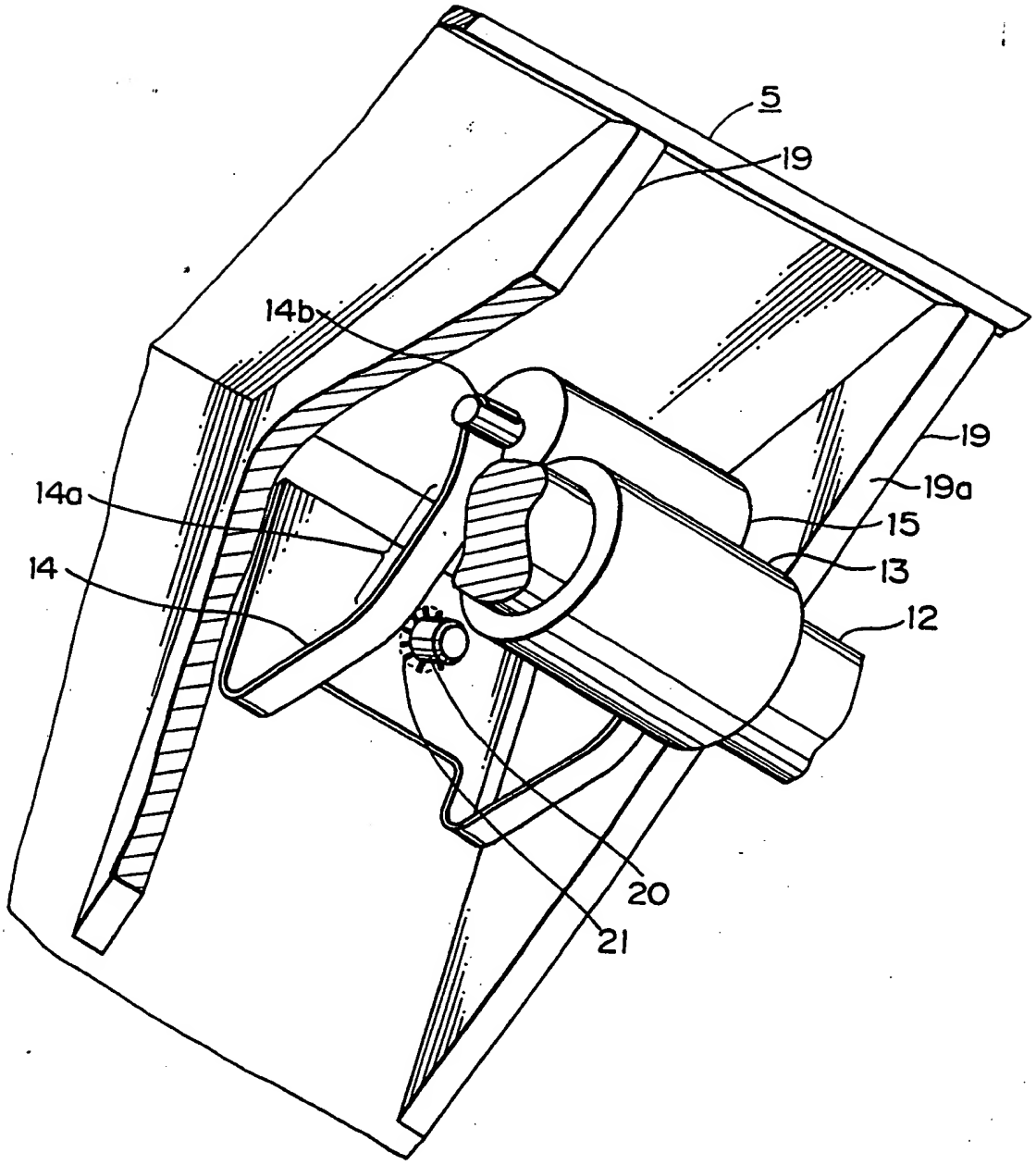


Fig.5

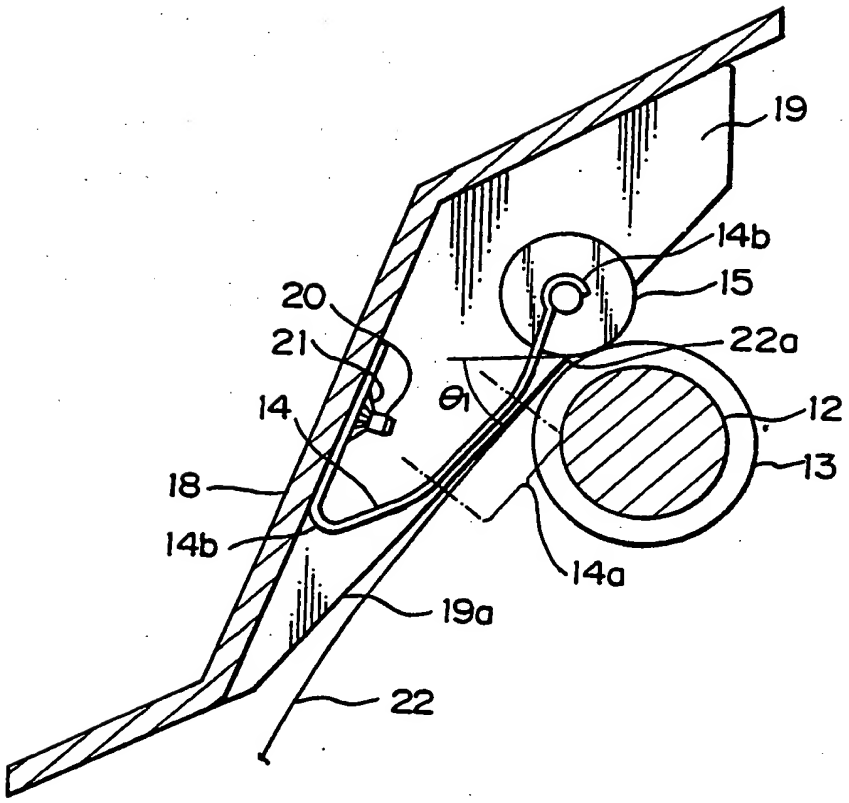
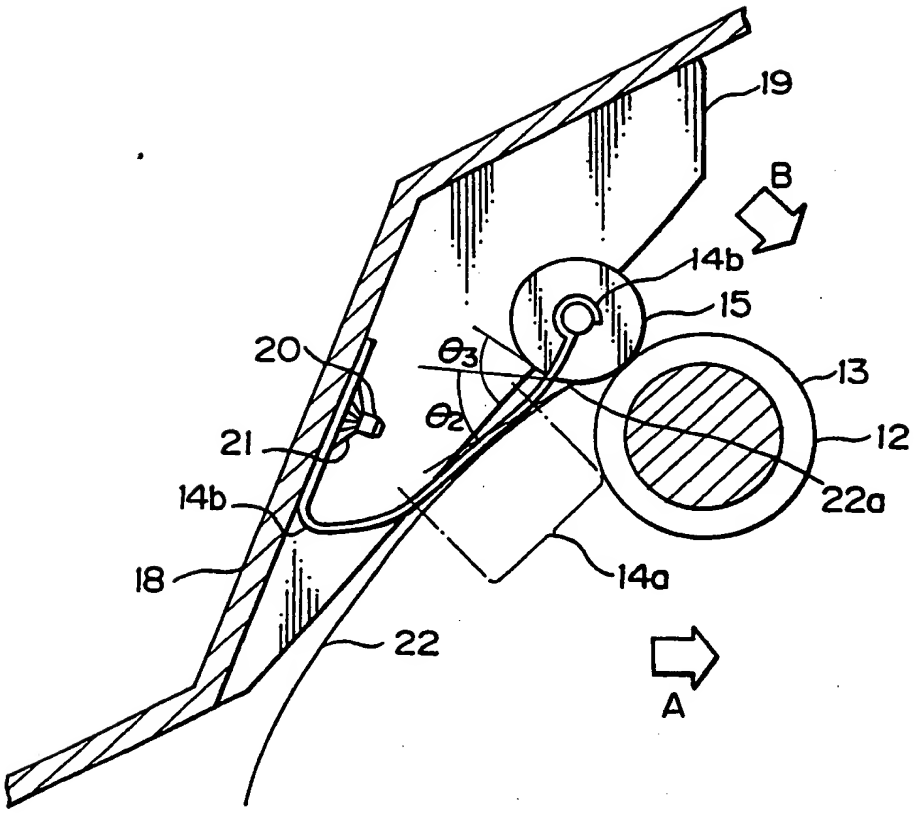


Fig.6



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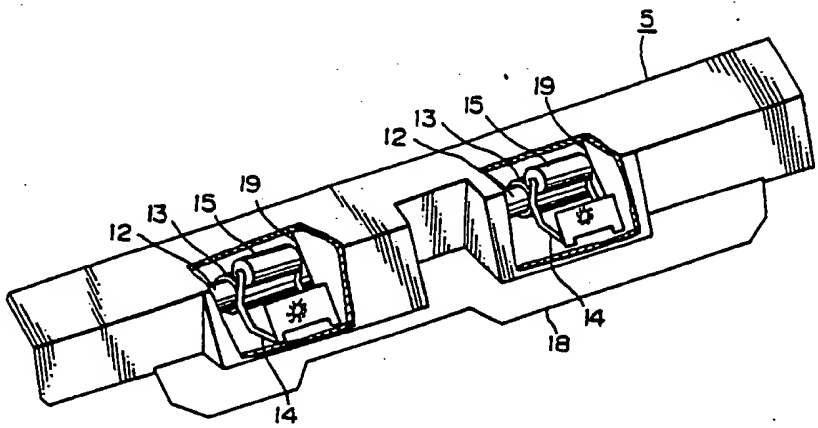

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EUROPEAN SEARCH REPORT

Application Number

EP 89 12 0626

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,A	US-A-3 756 589 (CARBINE) * the whole document *	1,2,3,4	B 41 J 13/14 B 65 H 5/06 B 65 H 29/22 B 65 H 29/52
Y,A	US-A-4 540 297 (IMAIZUMI) * column 4, line 30 - column 5, line 3 * * column 8, line 15 - page 31; figures 1, 2 *	1,2,3,4	
A	EP-A-0 127 242 (OCE-NEDERLAND) * page 3, line 5 - page 5, line 5; figures 1-3 *	1,4	
A	IBM TECHNICAL DISCLOSURE BULLETIN. vol. 23, no. 2, July 1980, NEW YORK US pages 678 - 679; LLOYD: "Paper feed mechanism" * the whole document *	1,3,4	
A	IBM TECHNICAL DISCLOSURE BULLETIN. vol. 26, no. 7b, December 1983, NEW YORK US pages 3901 - 3902; KROEKER: "Buckle spring"		
A	PATENT ABSTRACTS OF JAPAN vol. 8, no. 177 (M-317)(1614) 15 August 1984, & JP-A-59 69330 (TAKAHASHI) 19 April 1984, * the whole document *		
A	US-A-4 030 588 (HANAGATA)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B 41 J
B 65 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	03 December 90	ADAM E.M.P.

CATEGORY OF CITED DOCUMENTS

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